EOSDIS IV&V
Monthly Program Status Report

For the Period 9/1/94 to 9/30/94

(Deliverable 0201.3)

October 14, 1994

Prepared by:

INTERMETRICS
6301 Ivy Lane
Greenbelt, MD 20770

Prepared for:

NASA Goddard Space Flight Center
Code 505
Greenbelt, MD 20770

EOSDIS IV&V
Monthly Program Status Report
For the Period 9/1/94 to 9/30/94

(Deliverable 0201.3)

October 14, 1994

PREPARED BY:

Rich Saad
Task 2 Leader

RECEIVED BY:

Lee LaCoste
Document Log Manager

APPROVED BY:

Ron Cariola
Program Manager

INTERMETRICS
6301 Ivy Lane
Greenbelt, MD 20770

Table of Contents

Section ***Page***

1. PROGRAMMATIC INFORMATION..... 1
1.1 IV&V Project Organization Chart..... 1
1.2 Overview of Work Being Performed..... 1
1.3 Overview of Schedule Status..... 4
1.4 Performance Assurance Activities/Issues..... 7
1.5 Major Short Term Activities Planned..... 8
1.6 Key Long Range Plans/Schedules..... 9

2. TECHNICAL INFORMATION..... 10
2.1 Task #3: Independent Verification and Validation..... 10
2.2 Task #4: IV&V Infrastructure and Tool Development..... 10
2.3 Task #5: Requirements Analysis and Traceability..... 12
2.4 Task #9: Key Interface Analysis and Test..... 13
2.5 Task #10: Development of EOSDIS Certification Plan..... 15

SECTION 2 APPENDICES..... 17
Appendix 5A: Progress Summary of Level 3
Technical Integrity Requirements..... 18

3. FINANCIAL/CONTRACTUAL INFORMATION..... 19
3.1 Cost Reporting..... 19
3.2 Staffing..... 28
3.3 Rate Information..... 34
3.4 Financial/Contractual Related Issues..... 44

1.1 IV&V Project Organization Chart

Exhibit 1-1 illustrates the current organizational structure of the EOSDIS IV&V team. For each lead position, we have identified company affiliation, geographic location, phone number, and task assignment. Also included is the number of full time equivalent engineers assigned to each technical task.

1.2 Overview of Work Being Performed

a) List of Active Task Assignments

- Task 1: IV&V Program Management
- Task 2: Facilities, Operations, and Program Reporting
- Task 3: IV&V Plans
- Task 4: IV&V Infrastructure and Tool Development
- Task 5: Requirements Analysis and Traceability
- Task 9: Key Interface Analysis
- Task 10: Development of EOSDIS Integration and Certification Plan

b) Key Recent Accomplishments

- **Programmatic**

  - Provided inputs to new task SOW for IV&V support of the EDOS program.

  - Coordinated with Tom Wilson from the NASA IV&V Software Facility in WV to establish a data link between the Greenbelt office and GSFC. A 56KB line should be installed within 40 days after October 1, 1994. Once we provide appropriate justification, this link will be upgraded to a T1 line.

  - Participated in drafting an MOU between the IV&V team and the WVU Research Group located at the IV&V facility at Fairmont. This agreement focuses on collaborate efforts 1) To improve IV&V processes, 2) To recommend development methods which will produce systems that can be more readily traced and tested, and 3) To quantify the value of IV&V for large development programs.

  - Finalized arrangements to move some team members into additional temporary space within the Greenbelt office complex until permanent space is ready for occupancy.

Exhibit 1-1: Org Chart (Landscape)

- **Technical**

  - Under Task 3, began developing the Independent System V&V Plan (ISVVP). Also, continuing to expand the Tool Management Plan appendix to the IV&V Management Plan (IVVMP).

  - Under Task 4, continued developing/implementing M1 tools and preparing for the M1 demonstration. Also continued analyzing the ISE requirements and defining the ISE development environment.

  - Under Task 5, continued analyzing Level 3 technical integrity requirements and populating the Automated Requirements Database (ARDB). Also, continued the ETS monitoring activity and generated the EOSDIS Modeling Assessment Plan.

  - Under Task 9, collecting utilization data for 7-day period to support the Version 0 performance analysis; in process of defining technical approach for follow-up effort. Also, in process of completing TRMM pilot analysis and starting requirements review of Institutional IRD.

  - Under Task 10, reviewed/commented on draft of the EOSDIS Integration and Certification Definition Document (EICDD), and briefed new EOSDIS Project system engineering and system integration managers on IV&V certification activities. Also, initiated work on Certification Criteria Determination white paper.

c) New/Proposed Task Assignments

- **Special Studies Task** - Recommend adding an additional task to the IV&V contract to address special short-term needs which may arise during the course of this IV&V effort. These needs could then be effectively handled without disrupting on-going, pre-existing tasks. This Special Studies task could be activated and deactivated as required.

- **ECS Traceability Assessment** - Need to address the impact of traceability problems associated with planned ECS releases. Currently, services/capabilities do not map directly into requirements, making system verification and certification difficult. In addition, IRDs are not linked or coupled with requirements. Need to determine a work-around for IV&V activities, as well as the associated additional level of effort.

d) Follow-up on Action Items from August 15 PSR

1) Meet with Steve Wharton, the NASA EOSDIS Project Scientist, for information on science user interfaces. **Action:** *Frank Rockwell, Intermetrics*
Status: Done.

2) Adjust EOSDIS IV&V milestones and activities to reflect changes in ETS program.
Action: *Joe Gitelman, NASA / Ron Cariola, Intermetrics*
Status: Since ETS interacts heavily with EDOS, the requirements for EDOS must first be stabilized before IV&V activities related to ETS can be adjusted. Once EDOS is fully defined, IV&V milestones and activities will be appropriately changed.

3) Consider conducting a Criticality Analysis and Risk Assessment (CARA) for the entire EOSDIS program to determine future tasks. **Action:** *Joe Gitelman, NASA / Ron Cariola, Intermetrics*
Status: To address this need, a CARA will be conducted as part of each IRVVP (i.e., at each system release).

4) When reviewing Interface Requirements Documents (IRDs), be sure to contact the government lead. Specifically, contact Ted Ackerson for discussion on TRMM IRD. **Action:** *Roland Weiss, CTA*
Status: Obtained a list of government leads for each IRD. Designated specific team members as primary interfaces for each lead. Also, contacted Ted Ackerson on 9/9/94 to discuss the baselining status of the TRMM IRD and to review progress and schedule status.

5) Contact Booz Allen to set up read/access to the ECOM Level 3 requirements. **Action:** *Frank Rockwell, Intermetrics*
Status: Contacted Paul Sullivan of Booz Allen. Clarified our team's need for access to ECOM Level 3 data and agreed on a plan to obtain this access.

6) Emphasize the importance of Intermetrics' subcontractors to submit their 533 reports to the Government on time. **Action:** *Pam McLaughlin, Intermetrics*
Status: Accomplished, both verbally and in writing to all subcontractors.

1.3 Overview of Schedule Status

Exhibit 1-2 presents the latest (i.e., dated September 23, 1994), high level milestone chart for all technical tasks assigned on the EOSDIS IV&V contract. In conjunction with this exhibit, Exhibit 1-3 lists in chronological order all deliverables/milestones associated with the contract and the status of each.

Exhibit 1-2: Gitelman Milestone Chart (Landscape Paste-up)

Date Due	Milestone/ Deliverable	Task #	Status*	Comments
7/8/94	ECS Release A SDR IV&V RIDs	5	C	Accomplished within 17 days of contract award.
7/8/94	SDR IRD RID Package	9	C	Accomplished within 17 days of contract award.
7/15/94	M1 Requirements and Architecture	4	C	Submitted on time.
8/16/94	IV&V Management Plan - Draft	3	C	Submitted ahead of schedule.
8/16/94	M1 Initial Tool Architecture Review	4	C	Conducted ahead of schedule.
8/30/94	ISE System Requirements - Draft	4	C	Submitted on time.
10/17/94	ISVVP - Initial	3	IP	On target.
10/17/94	Certification Criteria Determination Report - Initial	10	IP	On target.
10/18/94	M1 Demonstration	4	IP	On target.
10/28/94	Preliminary ECS Rqts Analysis Report	5	IP	On target.
10/31/94	ISE System Requirements - Update	4	IP	On target.
10/31/94	Version 0 User Assessment	9	IP	On target.
12/1/94	ECS-TRMM IRD Pilot TAR	9	IP	Report will be issued when IRD is baselined.
12/16/94	IV&V Management Plan - Final	3	IP	Tool Management Plan appendix will be submitted in mid to late October.
12/16/94	ISVVP - Update	3	O	
12/16/94	ISE System Architecture - Draft	4	O	
12/16/94	ECS Release A PDR IV&V RIDs	5	O	
12/16/94	Performance Dependency Analysis Tool Requirements	10	O	
12/16/94	EICP - Initial	10	O	
12/30/94	Initial ARDB	5	O	
12/30/94	EOSDIS Modeling Assessment Report	5	O	
1/16/95	ISE System Architecture Review	4	O	
1/16/95	ESC Release A PDR RIDs	9	O	
1/31/95	ISE System Architecture - Update	4	O	
1/31/95	ISE Development Plan - Draft	4	O	
2/16/95	M1 Revision 2 Demo	4	O	
2/28/95	ISE Development Plan - Final	4	O	
3/1/95	Initial ARDB for IRD Requirements	9	O	
3/16/95	ECS Interim Rel 1 Rqts Analysis Report	5	O	
3/16/95	ISE Element Requirements - Draft	4	O	
3/16/95	EICP - Interim	10	O	

* C = Completed, IP = In Process, O = Open, D = Delayed, CX = Canceled

EXHIBIT 1-3: Status of Milestones/Deliverables

Date Due	Milestone/ Deliverable	Task #	Status*	Comments
4/17/95	ISE Element Requirements - Update	4	O	
5/16/95	ISE Element Software Design - Draft	4	O	
5/31/95	ISE System Design Review	4	O	
6/15/95	Certification Criteria Determination Report - Update	10	O	
6/15/95	EICP - Final	10	O	
9/30/95	Draft Release IR-1 Test Plans and Test Procedures	11	O	
12/30/95	Final Release IR-1 Test Plans and Test Procedures	11	O	
6/1/96	Initial Release A Test Plans and Test Procedures	11	O	
ETS CDR + 2 weeks	ETS CDR RIDs	5	O	
Release A CDR + 2 weeks	ECS Release A CDR IV&V RIDs	5	O	
As Completed	Release IR-1 Test Reports	11	O	

* C = Completed, IP = In Process, O = Open, D = Delayed, CX = Canceled

EXHIBIT 1-3: Status of Milestones/Deliverables (Continued)

1.4 Performance Assurance Activities/Issues

- Program-level training on the larger aspects of EOSDIS is currently being planned for all IV&V team members. The intent of this training is to give all team members a broader knowledge of the program as a whole, as well as a more fundamental sense of program goals and issues.

- Formal training on the RTM tool to support the analysis tasks (i.e., Tasks 5 and 9) has received Government approval. It is scheduled for early November.

- Training on Lotus Notes has been arranged and is pending Government approval. This groupware will be an integral part of the IV&V tool suite, used to facilitate cross-group communications, the IV&V document library, the E-mail utility, the hardware/software accounting system, as well as other functions.

- The electronic card catalog for the IV&V library has been implemented and is currently being populated. A Home Page will be added to the Internet and linked to Hughes' Electronic Data Handling System (EDHS) to facilitate user access.

- We are in the process of developing a formal tracking mechanism to monitor any issues raised by the IV&V team with respect to developer or program performance. This system will include the status or resolution of each issue and will be available for COTR review and comment.

1.5 Major Short Term Activities Planned

- **Office Operations**

  - Move the Greenbelt office to permanent quarters on second floor. This move is scheduled for early December.

- **Communications**

  - Continue developing interfaces and data access privileges between the IV&V team and Goddard, Hughes, TRW, CSC, and the Software IV&V Facility in West Virginia. Get on appropriate distribution lists.

  - Bring IV&V document library on-line.

- **Tasking**

  - Initiate EDOS IV&V activities and develop appropriate interfaces with TRW.

  - Provide inputs to the NASA COTR for establishing a Special Studies task which can be activated and deactivated as the need arises.

- **Technical Performance**

  - For Task 3, submit first draft of ISVVP to NASA by October 17, and submit revised Tool Management Plan appendix to IVVMP before the end of October.

  - For Task 4, conduct M1 demonstration on October 18, and begin defining the ISE architecture. Also, procure initial ISE development environment tools.

  - For Task 5, establish working environment for the evaluation copy of BONeS, a modeling and simulation tool. Also, complete Preliminary EOSDIS User Demographics Assessment Report and Preliminary Requirements Analysis Report.

  - For Task 9, continue drafting TRMM Technical Analysis Report (TAR) and continue reviewing draft Institutional IRD. Also, analyze V0 utilization data and write report on findings by October 31.

- For Task 10, deliver draft of Certification Criteria Determination white paper by October 17, and initiate development of the EOSDIS Integration and Certification Plan (EICP) in mid-October.

1.6 Key Long Range Plans/Schedules

The IV&V team will support the activities and milestones identified in Exhibit 1-2. Emphasis will be placed on those activities that are on the critical path to support the on-time launch of the spacecraft. Such activities include Key Interface and Integration Testing (KIIT) and System Certification.

2. TECHNICAL INFORMATION

2.1 Task # 3: Independent Verification and Validation Plans

a) Task Accomplishments

- Initiated Independent System V&V Plan (ISVVP).
- Added one additional staff member who has been assigned responsibility for integrating the ISVVP.
- Made significant headway in revising and expanding the Tool Management Plan appendix to the IVVMP.
- Supported technical interchange meetings.

b) Issues/Concerns

- None.

c) Subcontractor Performance

- CTA and EWA were responsive in providing write-ups for certain sections of the ISVVP.

d) Planned Activities

- Release first draft of ISVVP to NASA by October 17, 1994.
- Release revised Tool Management Plan appendix to IVVMP to NASA mid to late October.
- Obtained comments from NASA on IVVMP and begin revision.
- Support program briefings as required.

2.2 Task # 4: IV&V Infrastructure and Tool Development

a) Task Accomplishments

- Continued developing/implementing M1 tools; prepared preliminary M1 demonstration material for internal review which consisted of the following tools: Requirements Traceability Management (RTM) tool, Automated Requirements

Database (ARDB), Interface Analysis Database (IADB), Mosaic, Block Oriented Network Simulator (BONeS), and Lotus Notes.

- Developed requirements and interface analysis data schemata that support the current requirements and interface analysis approach for the ISE. Portions of these schemata will be implemented under M1.

- Continued analyzing the ISE requirements and defining the ISE development environment. Activities included: 1) Identifying PC client/server development tools, a PC CASE tool, and a PC Configuration Management tool; 2) Identifying an integrated database concept that will support PC and Unix applications both locally and on a wide area network. This approach will result in cost savings, since it will reduce reliance on X-Terminal hardware as well as the more expensive Unix-based tools/applications.

- Continued evaluating the Synerge and Interface Data Consistency Analyzer tools for use on interface analysis tasks.

- Conducted basic internal training for the RTM tool.

b) Issues/Concerns

- Various Task Leads have begun using analysis tools which may not be fully compatible with the anticipated ISE. To alleviate this concern, we are currently defining a migration strategy which will ensure that the data resulting from the use of these tools can be migrated to the ISE at a later date.

- Since both the ECS and ECOM system primes have not fully selected their tool suites, we have delayed the final selection of our tool environment so that it can be made compatible with theirs.

c) Subcontractor Performance

- CTA performed well in analyzing the ISE and in defining/developing interface analysis tools.

- EWA performed well in supporting the Fairmont system administration function and in identifying M1 tool solutions.

d) Planned Activities

- Prepare for the October 18 M1 demonstration to be given at the IV&V Greenbelt office.

- Complete the development of the M1 user interface for the Requirements Analysis (Task 5) and Key Interface Analysis (Task 9) tools.

- Continue analyzing the ISE requirements to support the next delivery of the ISE requirements document.

- Initiate the definition of the ISE architecture.

- Procure initial ISE development environment tools.

- Continue tool evaluations.

- Complete network communication development and configuration to enable full use of network capabilities.

- Support program briefings as required.

2.3 Task # 5: Requirements Analysis and Traceability

a) Task Accomplishments

- Continued analysis of Level 3 technical integrity requirements (See Appendix 5A for progress summary). Also, conducted in-house mini-RTM training class for selected Task 5 personnel and imported ECS requirements traceability database (Level 2 - Level 4) into the IV&V RTM tool. In addition, added Level 2 requirements and (draft) summary spreadsheets to the Automated Requirements Database (ARDB) to store Level 2 - Level 3 traceability analysis results.

- Continued ETS monitoring activity by attending regularly scheduled meetings and reviewing documents.

- Met with Steve Wharton (EOSDIS Project Scientist) to discuss the role of IV&V in promoting science user satisfaction.

- Generated EOSDIS Modeling Assessment Plan, assigned personnel, and began work. Also, met with Chris Daly (ESDIS) and Mark Settle (HAIS); established regular meeting schedule. Attended modeling presentation at HAIS.

- Attended HAIS monthly project review and independent EOSDIS architecture presentation.

- Reviewed/critiqued ARDB user front-end implementation.

b) Issues/Concerns

- None.

c) Subcontractor Performance

- Subcontractor performance from CTA and SMSRC has been excellent.

d) Planned Activities

- Attend DAAC Users Group meeting scheduled for October 3 - 4.
- Present modeling assessment status at Program Status Review (PSR) on October 17.
- Support the M1 tools demonstration scheduled for October 18 - 19.
- Attend IWG meeting scheduled for October 19 - 21.
- Install evaluation copy of BONeS tool and establish working environment.
- Complete Preliminary EOSDIS User Demographics Assessment Report.
- Complete Preliminary Requirements Analysis Report.
- Support program briefings as required.

2.4 Task # 9: Key Interface Analysis

a) Task Accomplishments

- **TRMM Pilot Analysis**
  - Only one section of the IRD remains to be peer reviewed. Traceability will not be performed until RTM is available.
  - In the process of completing comparison between IRD performance requirements and those in external documents.
  - Determined that the IRD is basically sound. Flagging issues at the requirements level that should be re-examined when the ICDs are issued. The IRD review will expedite the ICD analysis.

- **Version 0 Performance Analysis**
  - Collected samples of utilization data points from two DAACs and the DAAC network. Started developing a spreadsheet using these data points.

- To support network analysis, collecting utilization data for 7-day period. MSFC, LaRC, and GSFC are currently configured to utilize the network.
- To support DAAC analysis, collecting utilization data for 7-day period from GSFC and LaRC. (MSFC DAAC will be down during our data collection period.)
- Contacted HAIS regarding Internet Study. The study is concerned with proving the *future* performance of the Internet and not characterizing *current* performance. Thus, it is not useful for our V0 Analysis effort. Investigating the possibility of obtaining Internet statistics by measuring performance at the routers for the modeled data centers (MSFC, LaRC, and GSFC).
- Currently defining technical approach for follow-up effort. Several changes may be in place in the November/December time frame, allowing us to characterize delays for the data request and order process. Specifically, IMS software for applying time stamps may be in place; clocks may be synchronized; and all DAACs may be on the DAAC network.
- Contacted HAIS regarding Open View tool, as suggested by Sol Broder. Tool is will not be used in the short term, since it provides the same information as that provided by the DAAC Network.

• **Analysis of Other Key Interfaces and Tool Requirements**
- Have started requirements review of Institutional IRD, which will be baselined shortly according to HAIS. Initiated contact with Gene Smith, the GSFC manager for this IRD. Also started to attend meetings of the System Implementation Team (SIT) chaired by Smith.
- Reviewing status of IRD/ICD schedule to identify if there are any issues and to determine task priorities over the next two months.
- Developing schema for interface database and interface tool demonstration.

b) Issues/Concerns

• HAIS informed the IV&V team that HAIS is performing their own Version 0 Analysis and that some overlap of effort may exist. We are sending an inquiry to Gil Scott about this.

• The V0 Analysis work has forced us to fall behind in the peer review of IRD requirements. To alleviate this problem, one Task 5 person has been assigned to support this task.

• Since IRD work is expected to phase up in early November, extending the V0 Analysis to December 31 as discussed will impact our ability to meet future milestones by getting us behind schedule as IRDs are baselined. We suggest continuing the Version 0 analysis under a new Special Studies task, especially if the work were to continue past December 31.

- Our analysis task would be simplified if all ICDs had a common format.

c) Subcontractor Performance

- CTA is the task lead for this effort. Their performance has been excellent.

d) Planned Activities

- **TRMM**
  - Continue TRMM Analysis.
  - Continue drafting TAR, to be issued when IRD is baselined.

- **Version 0**
  - Prepare for PSR presentation on October 17.
  - Analyze utilization data and write report by October 31.
  - Define approach for next phase, making use of time stamps to characterize delays.

- **IRD/ICD Analysis**
  - Continue review of draft Institutional IRD.
  - Consider reviewing ECS Operations Concept.

- **Staffing**
  - Tentative plan is to add staff in November instead of December. Will review September actuals to determine feasibility.

- **Meeting Support**
  - Support program meetings and briefings as required.

2.5 Task # 10: Development of EOSDIS Certification Plan

a) Task Accomplishments

- Supported weekly Ground System Interface Working Group meetings.

- Reviewed and commented on the revised draft of the EOSDIS Integration and Certification Definition Document (EICDD).

- Provided briefing concerning IV&V certification activities to the new EOSDIS Project system engineering and system integration managers (Ellen Herring and Janice Smith).

- Supported technical interchange meetings with other tasks to exploit the synergism between this task, the V0 Analysis activity (Task 9), and the Modeling Assessment activity (Task 5).

- Initiated work on Certification Criteria Determination white paper. This included numerous technical interchange meetings with CTA concerning the approach to certification.

b) Issues/Concerns

- None.

c) Subcontractor Performance

- CTA has been very flexible in their resource allocation. They are making a major contribution in the writing for the Certification Criteria Determination white paper.

d) Planned Activities

- Deliver draft of Certification Criteria Determination white paper to NASA by October 17.

- Prepare briefing on Integration and Certification Approach for the October 17 PSR.

- Initiate development of the EOSDIS Integration and Certification Plan (EICP) in mid-October.

- Support other program briefings as required.

SECTION 2
APPENDICES

APPENDIX 5A

Progress Summary of
Level 3 Technical Integrity Requirements

3. FINANCIAL/CONTRACTUAL INFORMATION

Section 3 of This Report

Has Been Removed

Due to Proprietary Content.